SPACE DOUBLE

PyroTechnics

P.O. Box 217
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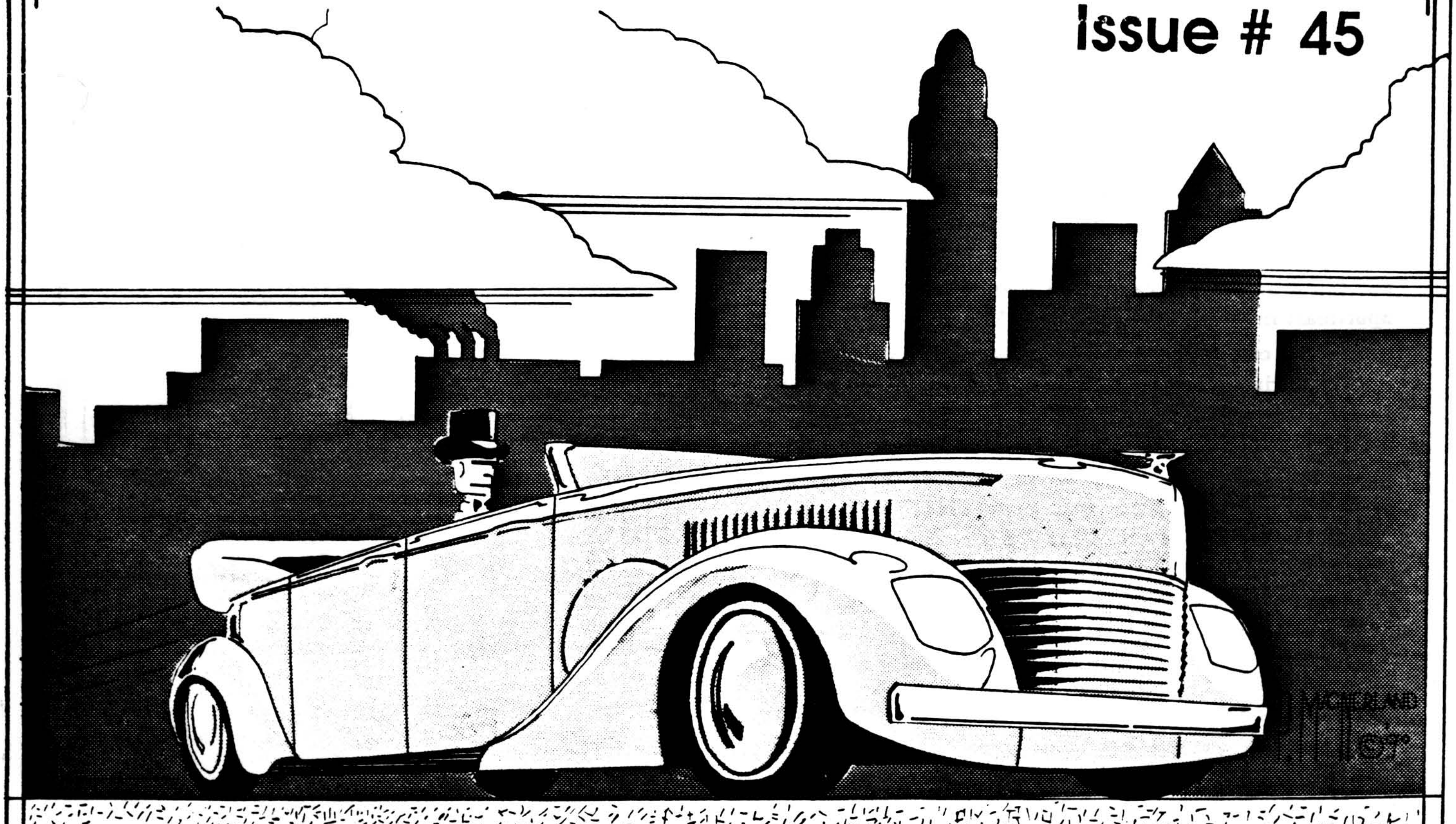
First Class Postage

Issue # 45

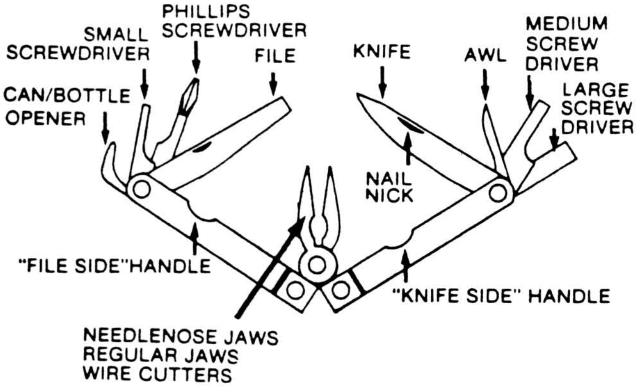


PYROTECHNICS

A Couple of Tools

Al Duester

There is an alternate to the Swiss Army Knife (or in my case, an adjunct). It is the Leatherman Tool, and I was introduced to it a few months back. If you find that a knife plus a few screwdrivers is a handy thing, but your real need is for a pair of pliers, this is the tool you need.



The total tool list reads: Knife; awl; small, medium and large screwdrivers; can/bottle opener; Phillips screwdriver; 8" (20 cm.) ruler; file (with fine and coarse sides plus metal saw edge); and pliers with needlenose and regular jaws and wire cutter. The tool folds to 4"x1"x1/2", and weighs 5 ounces. Campmor has it for $35, including a leather belt sheath. It's all stainless, with a 25-year warranty.

Campmor
810 Route 17 North
P.O. Box 997-R
Paramus, NJ 07653-0997
(800)526-4784 or (201)445-9868

The Leatherman is order Number 81063-R. Most gun and tackle stores also carry it. I wouldn't be surprised if Sportmart in your area has it for $35 or less.

Are you one of those of us who fall prey to a strange malady during late summer? Do you have a wild and uncontrollable desire to drive great distances to the Upper Peninsula of Michigan and spend days clambering about on huge piles of rock for tiny bits of copper? If so, COMB Liquidators has cheap metal detectors for sale. "Treasure Tracker" detectors are $88 plus $5.50 shipping. Order #C51-7401-011. Phone is (800)328-0609. You can probably pick one up at Minicon, if they last. They appear to have sensitivity, discrimination, and volume controls, a speaker, and a meter. 25" adjustable stem, and they claim to have an auto-tune system. No reports available on performance or quality, unfortunately.

By the way, COMB also has Welbilt bread machines (like DAK's but different control panel graphics) for $199 plus $12.50 shipping. I'll let you know if the factory claims that they have power backup.

TickTockTech Presents

The C Function Warehouse

All the C functions you want in one *comprehensive* library!

Just look at all you get!

acme()
atoz()
bazzfazz()
beammeup()
beardown()
bitbucket()
boil()
burpp()
chlife()
chorch()
clearoperator()
closecall()
cornflakes()
crabs()
crashnburn()
crotch()
crotchar()
crotche()
cutpurse()
deaddog()
dive()
dizzy()
dos_drop()
dos_explod()
dos_goodtime()
dowahdiddydiddy()
eocentury()
existential()
fawdowngoboom()
feef()
ffindc()
fgetmenot()
fgrunch()
fhalfclose()
fleeble()
floob()
flosec()
flushtwice()
foof()
footprintf()
forgetpos()
fpervert()
fputz()
frevert()
frood()
fsnitch()
fwipes()
getdown()
greep()
greps()
grunch()
hroom()
issomething()
issuper()
isuseful()
isxsuper()
izzy()
kaboom()
knuckleball()
loopforever()
losechar()
milnot()
miltcanf()
missaturn()
mudhead()
preggers()
putz()
regrets()
ribbet()
rudenoise()
scotfree()
sgrunch()
shakenbake()
splatt()
swab()
swapswap()
tearopen()
terror()
toother()
toouter()
tounder()
tribble()
trouble()
veerg()
vroom()
wascallywabbit()
zipcrash()
ziperase()
zipwipe()
zipzip()

Yes! Send me *The C Function Warehouse* right away! I understand that every function in the library depends crucially on a weird brand of video adapter that is no longer made.

Name: ____________________
Address: ____________________
____

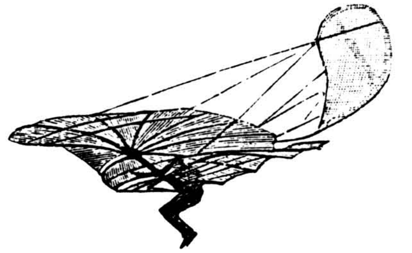
Please specify your compiler:

☐ Chicken O' The C
☐ C Here Now!
☐ Intransigen-C
☐ C What You've Done
☐ Can't C It
☐ C-D
☐ C-Oh-Two
☐ Nobody Knows the Trouble I've C'n
☐ C-More Butts
☐ C Me, Feel Me
☐ C What I Mean
☐ C Sick
☐ C To It
☐ C Saw
☐ Grea-C
☐ C D B?
☐ C-Man Ordinary
☐ Flop-C, Mop-C, Cottontail & Peter

Please specify desired memory model:

☐ Just a tee-totsy little bit
☐ Tiny
☐ Small
☐ Compact
☐ Medium
☐ Large
☐ Huge
☐ Bigger Than That
☐ Really Unbelievably Gross and Obese
☐ Macintosh

Chuck Off



HOW TO RUN THE WORLD
(On Solar Energy)
Kevin Varner

We have all heard occasional "back of the bus" conversations regarding some sort of conspiracy by a nebulous "monopoly" to "suppress solar." Actually, if the goal of some centralized agency is to hold back useful solar development, all the "suppressors" have to do is sit back, relax, and allow the power-your-refrigerator-from-a-panel-on-your-roof advocates all the media time they want in order to broadcast their ivory-tower "solutions." The average person -- living in a cloudy, temperate climate -- knows that rooftop-scale solar can't really put a tiger in his tank. Most people everywhere in the world with half an ounce of grease-monkey sense know this. Futhermore, the world public assumes that there are no other solar-based options and so the collective attitude becomes one of staying with the conventional energy sources, despite the well-publicized limitations of such sources. It is now time that the world public begins to consider a more realistic type of solar energy as elaborated below.

The first principle in any plan to run the world on solar energy must involve some way to reconcile two numbers. The first number is 300 BTUs per square foot per hour. This is what the sun provides under ideal conditions. Such ideal conditions (no clouds) are clearly more likely to occur in deserts than in temperate regions. The second number is 200 quadrillion BTUs per year. This is approximately the world demand for energy. From this, it should be fairly clear that even if mankind possessed a 100% efficient solar conversion system, there would still be no way to avoid the need to cover several thousand square miles of land with solar collectors.

Let's assume that to make solar usable in either a local or desert context, the sunlight must be converted to electricity. The prospect of advanced developments in superconductor technology (with the implication of zero-loss electrical transmission) tends to make desert electricity generators more sensible than local. A desert collector will need to cover only about half to one-third the area that would need to be covered locally in order to generate the same amount of power. After the more cost-effective desert system was built, the designers could simply run a superconducting "extension cord" the thousands of miles between the distant source and local load center. The introduction of advanced superconductors will invalidate the long-repeated (but rarely-questioned) propaganda that solar is "by its very nature" a local resource. Also keep in mind that superconducting coils can store electricity directly.

Let us now make a further assumption concerning the collector cost. Let's assume the cost to be $1 per square foot. If we spend ten years covering a desert with on-the-order-of 50,000 to 100,000 square miles of collector priced as noted above, a sum of one or two trillion dollars will need to be invested. This is comparable to the world fuel bill for the same period. If the deployed collector had an efficiency of 10% to 20%, the entire world could (in theory) be powered by it.

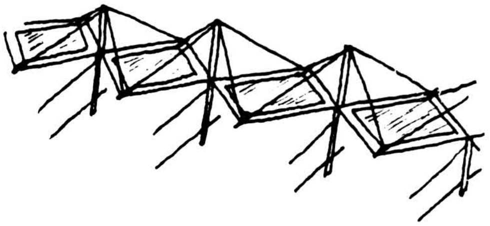
It should be obvious that to cover 50,000 square miles of desert in ten years, about 10 to 20 square miles will need to be covered each day, working seven days a week. This is nothing when you consider that American farmers repeatedly cover their half-million square miles of cropland every year with their implements for plowing, planting and harvest. Special machines will be needed to automate the desert-based artificial structure covering operation. Please note that both the deployment machinery and the collector components must be designed for "reverse installation" to facilitate the refurbishment of those collector parts that are subject to degradation. The process of deployment / refurbishment / redeployment / etc. might conceivably continue for centuries or millennia.

A major reason the above facts are not widely discussed (or even discussed at all) is the strange tendency of the media to dig down deep on social and political issues while scientific controversies are not subject to anything like the same treatment. I consider the recent "cold fusion" flap emanating from the comedy team of Pons and Fleischmann to be an excellent example of uncritical acceptance by the media of statements made by anybody with a scientific degree and a lab coat. If somebody had wanted to dig just a little, it could have been brought out that the commercial manufacture of heavy water can itself involve multi-stage electrochemical cells using a process known for decades. As far as I know, nobody has ever reported any weird science during electrochemical heavy water manufacture. *[Editor's note: that hardly seems like adequate cause to dismiss cold fusion* a priori. *For one thing, I doubt they use palladium electrodes. -- BDG]*

It would of course be reckless to leap directly from a "backyard-rooftop" level of minimal-solidity collector development to a giant desert-covering installation. You have to make Disneyland before you can build Epcot Center. In fact, it will be important to make several successively larger "solar Disneylands" in order to supply the knowledge base for the final "solar Epcot Center." Such a learning process will take decades an must account for all aspects of the use of a gigantic collector. This includes the problem of finding the best way to clean such a collector.

The absence of sticky terpene compounds (emitted by plants) in the Sahara will mean that dirt will not adhere to collector surfaces as much as it would in temperate latitudes. Nevertheless, the desert-based collectors will need periodic washing. The design of the washers might be patterned after mechanized crop irrigation equipment. Any cleaning devices should preferably be robotic in nature, to spare humans from repetitive work under torrid desert conditions.

The collector must be made of long-lifetime, nonplastic materials such as metals and glass. At the same time, in order to cost as little as a dollar a square foot (as proposed above), the bulk of the desert collector will need to use a design that amounts to a two-dimensional take-off on the minimal-solidity three-dimensional geodesic domes of Buckminster Fuller (see U.S. patent no. 3063521). As a result of my studies, I have concluded that the most cost-effective collector system involves the use of glass plates supported by properly arranged wires stretched along the ground as in a fencing network. See illustration:



The glass plates will be used as mirrors or as substrates for thin-film solar cells. The use of stretched-wire-based structures will streamline desert deployment logistics when compared with heavy conventional collectors that use angle iron and steel pipe. It is clearly easier to pay out wire from a spool than to attempt the same thing with heavier structural elements.

Present-day collectors tend to use a pedestal design that is "safe" in terms of being supported by decades of construction experience. Unfortunately, the material-intensiveness of pedestals is such that they use something like eight pounds of steel to hold up a single square foot of collector surface. Really. No fooling. Also, their foundations demand large amounts of concrete.

In general, mass-produced products made of steel and glass (cars, for example) tend to cost $1 to $2 per pound. If one accepts this hard fact, then one must also agree that only by "downsizing" solar collectors with respect to their solidity can one ever hope to get anywhere close to $1/ sq. foot. There is no hope otherwise; anything less than abandonment of the pedestal approach amounts to money-wasting stagnation. Abandon pedestals now or abandon them later.

As anyone can tell by looking at U.S. patents #4466423 and #4425904, an attempt has been made to escape from the "solidity trap" of pedestal design by using stretched wires for supporting glass plates. Both patents disclose fence-like structures. The structures are not as rigid under wind-loading as a "Fullerian" tensional design would be. Nevertheless, I find it very interesting that these patents were assigned to no less an agency than the U. S. Department of Energy. If there were no merit to using stretched wires to support plates of glass (for mirrors or thin-film solar cells) why did the DOE go to all the trouble needed to get these patents? Could it be because such structures use only a few ounces of steel to hold up a square foot of glass?

Large-scale desert-based tensional structures will have a huge environmental impact. Beyond this fact, it occurs to me that the desert property belonging to the United States, large as it is, actually is poorly suited for solar coverage by artificial structures. Call to mind the furious response from individuals living in the deserts of Nevada and Utah when it was seriously proposed to construct the MX "shell game" missile storage network, demanding construction equivalent to one-fourth of the interstate highway system, in those deserts.

The best deal America can get on large-scale solar will be to export to Middle Eastern countries the specialized machines needed to deploy minimal-solidity solar collectors. In the future this will offer a less threatening way to recycle petrodollars than to keep on selling weapons, chemical plants and nuclear reactors to the Arabs. Furthermore, the glass industry needed to supply material for huge collectors could most practicably be located in the Middle East where there exist enormous amounts of cheap fossil fuel for running such an industry.

The ideal locality in the Middle East to begin construction is the 23,000 square mile Selima Sand Sheet on the border between Egypt and Sudan west of the Nile River. There is an article on this naturally smooth geographic feature in the August 13, 1982 issue of *Science.*

Conclusion: Somebody show me the "Law of Physics" that rules out a program of the type described.

> "Without any censorship... fashionable trends of thought and ideas are carefully separated from those which are not fashionable. Nothing is forbidden, but what is not fashionable will hardly ever find its way into books or be heard in colleges."
> A. Solzhenitsyn

Kevin Varner is the inventor of a "Lightweight Heliostat System"; see U.S. patent #4488779.

Creditte Memory

by Steve King

Lately, much of the computer science literature has been devoted to the topic of cache memory. While cache memory is certainly a worthy topic, there is another advanced memory management technique that I feel is at least as important to the future of computing. I speak of creditte memory.

Let's start with an example. Imagine that you have a computer with 512K RAM (to make numbers easy) and that you use this computer 12 hours every day. What happens if you suddenly need to access more than 512K for a certain application? Well, if you use normal memory management techniques you'd better start shopping for more memory! If you use creditte memory, on the other hand, obtaining additional memory for short jobs is no problem.

The principle behind creditte memory is simple: If you need more memory than you have you can borrow it on the assumption that you "will have" the extra, eventually. Creditte memory is measured in "kilobyte–hours", abbreviated K–hr. In the example above, our 512K byte PC actually possesses 12288 K–hrs (512K x 24 hrs) of memory each day. In simple operation this would be 512K and the computer could be in operation 24 hours a day. But in practice we're only using the machine 12 hours each day. That means we can utilize up to 1024K of RAM at any time, paying the additional 512K back during the 12 hours we're not using the computer. 1024K x 12 hrs = 12288 K–hrs, the same as before.

The memory taken "on creditte" need not be paid back the same day. Imagine that we need 2M of memory (2048K) for a large spreadsheet. If this is done on Friday and we take the weekend off there's no problem. Saturday and Sunday will more than pay back the debt to Friday's computation!

Now imagine that we're going to take a 2 week vacation. That's 16 days (including the Saturday before we leave and the Sunday after we get back) that the computer won't be in use. 16 x 24 x 512K = 196608 K–hrs of memory is available to use before we leave! If we decided to use all our memory in just one hour Friday night we'd have 192 megabytes to play with. The perfect time to back up the hard disk!

I'm sure you can see the advantages to creditte memory. As long as the computer isn't in 24 hour use, it's easy to get extra memory on creditte and pay it off when the computer isn't in use. If you want to use creditte memory in your own IBM PC or compatible, go to your nearest computer store and ask for Entropy Enterprise's new "Creditte Card" half–slot expansion board. Available in 512K, 1M, and 2M versions. All versions have only an 18% annual percentage rate on long term creditte.

Pons and Fleischmann Address The Troops

by Charles Ott

A series of four skits, as presented by Moebius Theatre for Conclave XIV, October, 1989.

One

FLEISCHMANN: Hi, I'm Martin Fleischmann.

PONS: And I'm B. Stanley Pons of the University of Utah. We're the cold fusion fellows you've heard so much about.

FLEISCHMANN: We can create fusion right in a mayonaisse jar.

PONS: Using nothing but two palladium electrodes and some heavy water.

FLEISCHMANN: Or at least, we thought they were palladium electrodes.

PONS: We've been hearing so much about how other people can't duplicate our experiment, that we decided to go back and do some investigating. And you know what? Our electrodes weren't palladium at all!

FLEISCHMANN: It was an honest mistake. We were robbed!

PONS: We bought those "solid palladium" electrodes from a jeweler in Salt Lake City.

FLEISCHMANN: But it turns out they were actually made of something they call "Mormon Miracle Metal."

PONS: Which is actually chrome-plated bakelite. Imagine our chagrin!

FLEISCHMANN: Anyway, that explains why all of you have had trouble obtaining cold fusion.

PONS: Right! The trick is to use electrodes of "Mormon Miracle Metal." We can refer you to a source right here in Utah.

FLEISCHMANN: And for a lot less than we paid!

PONS: Sorry about all this confusion.

FLEISCHMANN: And thank you for your support.

DR. TECHIE'S NATURE CORNER

The Pipe Seal

Scientific name: *Phoca cacophonus*

Natural history: Famous for its colorful pelt and loud, wailing cry, the pipe seal is found on the remote, rocky seashores of the Outermost Hebrides. Despite their inaccessiblity, pipe seals play an important role in the lives of the Scots Highlanders, who use their skins to make what pass in Scotland for musical instruments and clothing. As each son in a Highlander family comes of age, he journeys to the remote, noisy islands where the pipe seals breed, and hunts for a seal whose pelt matches his family tartan. During this rite of passage, a favored son may carry his father's bagpipe, which can be used to mimic the call of the seal or flung into the sea as a decoy. The skins of the seals are used to make more bagpipes, and also as material for the Scots' national costume, which derives its name from an old maxim about the seals: "Ye kin nae wear them till they're kilt."

Current events: Recently the environmentalist organization Greenpeace petitioned the British government to exterminate the pipe seals, complaining that "they keep the whales awake." Despite appeals from music-lovers around the world, the Thatcher administration denied Greenpeace's request.

Art: Mary Lynn Skirvin. Text: Barry D. Gehm. Concept: the GT group mind.

Doing Dishes Without Getting Soaked

Lee Hart

> *"Jimmy Swaggart and Lillian Gish*
> *Come to muh home on the satellite dish.*
> *No time for work, and no time to fish,*
> *I just keep watchin' that satellite dish."*

My brother Jim is a videonut. There are eight TVs in his house (counting only those in regular use), three VCRs, hundreds of tapes, and the crowning glory: a 10' satellite dish.

I'm sure you've heard that satellite TV provides hundreds of channels without paying a cable company. But most people don't know the details. Jim installs them for a living, so here's a report on how it's done. I'll give mail-order discount pricing; retail is more, used of course is less. For additional info, pick up an *Orbit* magazine at the newsstand, or give me a call (616-782-3980).

Every major TV network distributes its programming to its member stations via satellite. Likewise, cable-only services like HBO, Cinemax and the Disney Channel are distributed to the various cable companies by satellite. In the late 70s, Bob Cooper ("Coop" to those in the know) discovered that a dedicated techie with the right equipment could receive these signals directly. He then proceeded to describe explicitly how to do it yourself in a landmark construction article in *Radio-Electronics*.

Early systems cost a fortune, and required more knob twiddling than an antique radio. But many people don't realize how much the technology has improved. When Steve Salaba told me his neighbor is paying $100 a month for a dish on a 5-year contract, I decided to write this article before someone I know gets ripped off like this. Fact is, $300 gets you the basics, and a top-of-the-line system can be had for $1500. You can install it yourself to save as well; it doesn't require any special tools or skill.

First you need a receiver, to convert the C-band microwaves from the satellite into a normal TV signal. The bottom-end units put a remotely tuned down-converter at the dish to step the microwaves down to 70 MHz. A 70 MHz receiver in the house converts this into an ordinary TV signal, and has the tuning knob for the remote converter to select the channel. These are cheap ($35-$100), work well, and tolerate long wire runs. Temperature drift is the main disadvantage, since the tuning circuits are out at the dish.

Next up are block receivers; they put a fixed-frequency crystal-controlled down-converter at the antenna, and a tunable receiver in the house. The wire coming from the dish carries a 430-930 MHz for 950-1450 MHz signal, the latter being more common. They cost $129 to $400, don't drift, and you can hook up multiple receivers to one dish (to watch more than one channel at a time). But the higher dish-to-house frequency restricts long cable runs.

About half the satellite channels are scrambled. A VideoCipher-II descrambler ($400-$500) decodes most of them. Some, like PBS, are "fixed authorization" so there's no monthly fee. Others charge a nominal fee; $25/year for CNN or ESPN. Those run by cable company affiliates are expensive; HBO plus Cinemax is $170/year; Showtime plus The Movie Channel is $186/year. As an alternative, you can pay a pirate to illegally modify your VC-II to descramble them for free (maybe, for a while). This is a real war zone, with both sides fighting for the right to screw you; more on this later.

Best is an IRD, or Integrated Receiver/Descrambler, at $600-$1200. This combines a 950-1450 MHz block receiver with a VC-II unit. IRDs tend to have lots of bells and whistles like remote control, built-in actuator control, stereo sound, on-screen graphics, etc.

Next, you need a dish antenna. They range from 4.5' to 12' in diameter; the bigger the dish, the more satellites it pulls in. A 4.5' gets about half of them; 10' gets them all anywhere in the continental US; 12' is used in fringe areas, or to counteract trees, terrestrial microwave interference, etc. Most dishes are made of aluminum mesh panels, which bolt together like an Erector set. Prices run from $39 (4.5'), $250 (10') or $600 (12').

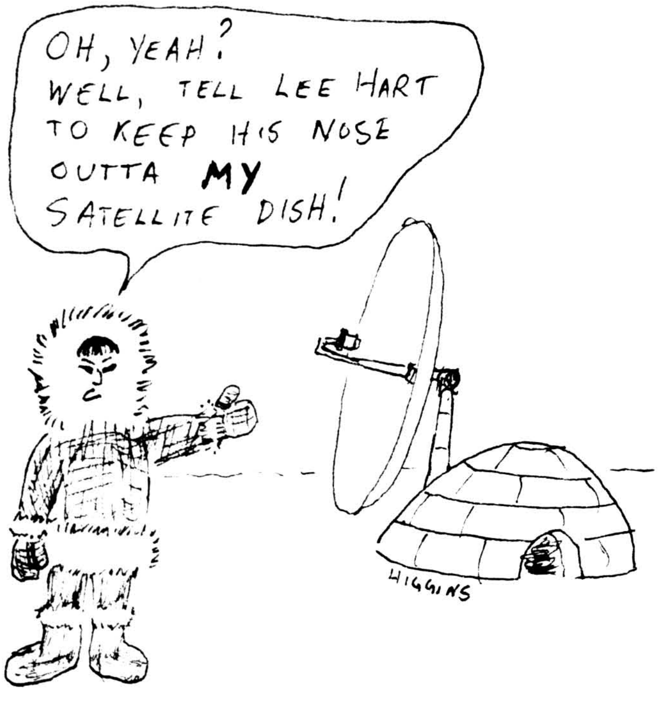
Mount the dish on something that won't bend more than a degree with several hundred pounds of wind loading. A 3.5" dia. piece of schedule-40 pipe is normal, or a roof, fencepost or tree if it's stiff enough. The satellites are in geosynchronous orbit, and are motionless relative to the earth. They lie roughly along the path followed by the Moon. Position your dish for a clear view of the sky along this path from about 170 to 260 degrees (SSE to WSW).

You can simply point the dish at your favorite satellite and tighten the bolts. After an initial "video orgy" many dish owners spend most of their time on one satellite anyway. To move between satellites., add a hand crank or motorized "actuator." Hand cranks have obvious shortcomings, but only cost $10-$20. Actuators run $40-$100 for the motor, and $50-$200 for the control box.

The dish focuses the microwaves into a "feed horn", or polarotor ($25-$60). The satellites are tilted at all sorts of odd angles in space, so their antennas can be horizontal, vertical, or anything in between. The polarotor compensates for this by (electrically) rotating your antenna to match.

Next comes the LNA (or LNB). LNA is "Low Noise Amplifier," which boosts the 3.8-4.2 GHz signal from the satellite into something normal circuits can find. They cost $20-$70. An LNB is a combined LNA and block converter (for use with a block receiver); they run $69-$100. LNAs are rated by temperature (in degrees Kelvin); a 50 K LNA is very good, 120 K is very bad.

Why temperature? The signal is so small that it can't easily be expressed in normal units (unless you call femtowatts normal). Any object above absolute zero radiates energy, called black-body radiation. So satellite gear is rated by the temperature an object would have to be to generate the same amount of microwave noise. This gives you some insight into just how tiny the signals are; an Eskimo's nose (at 20° C. = 293 K) generates more microwave "snow" than the LNA gets from a satellite. [Moral: don't let Eskimos sleep in your satellite dish. -- BG]


OH, YEAH? WELL, TELL LEE HART TO KEEP HIS NOSE OUTTA MY SATELLITE DISH!
HIGGINS

Alas, in Scramble-land.

Broadcast TV is based on the premise that the cost of the program is paid for by advertising. The viewer pays nothing; in fact, FCC regulations and international law generally consider any radio emission to be intrinsically public. They can be freely received by anyone as long as they are not used for profit, in violation of copyright laws, or for criminal activities. Broadcasters favor satellite TV, as it increases their viewing audience; the more viewers, the more they make on advertising.

Cable TV is based on the opposite premise; the viewer must pay. And so he does; the average customer pays $300 per year, making cable a billion-dollar industry that now serves over half of all TV viewers. In fact, cable is a monopolist's Mecca; the Infinite Profit Margin. Imagine having a legal monopoly to sell at any price you chose a product you get for free to customers who can't live without it. Cable hates satellite TV, because it threatens this monopoly.

Cable is now a "network" in its own right, like NBC, ABC, or CBS. It has its own channels, creates its own programs, and buys exclusive rights to movies and sporting events. The local access channels, must-carry rules, rate control boards, and restrictions on advertising and editing were all removed in the deregulatory euphoria of the Reagan years. This has freed cable to consolidate its monopoly. Since cable is the conduit by which the competing networks reach half their viewers, cable companies have been dictating terms; be "nice" to us, or we'll drop your station.

An interesting dichotomy exists. On one hand, cable vigorously defends its right to receive TV broadcasts for free, claiming it is "public" information. On the other hand, they claim that their own broadcasts via satellite and microwave links are "private," and can't be received without paying. Congress and the FCC do not agree; despite intensive lobbying, satellite TV counts as public broadcasting.

OK, if they can't make it illegal to receive, they'll make it impossible to watch. Cable companies experimented with all sorts of scrambler systems that required a special decoder for viewing. Unfortunately, they hired more lawyers than engineers; any techie that knew which end of a soldering iron got hot could beat most of them. Each system was secure only a matter of months before the video pirates cracked it.

Then a Canadian firm, Oak Orion, invented still another scrambling method. Another firm, M/A-Com, was so impressed that they copied it (without paying for the privilege) and named it VideoCipher-II (their VC-I was a stillborn turkey). Lawsuits followed, M/A-Com got bought out by General Instruments, and the USA's balance of trade deficit got $20 million worse.

GI began touting VC-II as the ultimate scrambling system. It used the ultra-secure DES (Data Encryption Standard) algorithm to encrypt the sound, so it was inconceivable that it could be cracked. The cable companies loved it; they quickly scrambled their own channels (HBO, Showtime, Cinemax etc.) with VC-II, and pressured the other broadcasters to do the same. Thus we have the absurd situation of a network like PBS, which is manifestly public and supported by our tax dollars, scrambling its signal so only the cable companies can receive it.

Dish owners yelled "foul" as their high-tech investments turned into expensive yard ornaments. Congress stepped in and threatened legislation unless the cable companies agreed to sell VC-IIs to home dish owners, and offer subscriptions to HBO, etc., at a rate comparable to cable service.

Cable's idea of "comparable" turned out to be $395 for the VC-II (compared to $39 for a typical cable converter) and a complex web of subscription fees that were always more than local cable customers paid. The pirates warmed up their soldering irons.

Eight months later, the "Three Musketeers" chip appeared. Stick it in your VC-II, subscribe to one service, and you get ALL services (one for all, all for one; get it?). THen came the "Clone" chips, to make your VC-II serial number identical to someone else's; whatever he subscribes to, you get as well. Finally, the "Wizard"; your friendly neighborhood mage gives you a "magic word"; type it on your VC-II's keypad and POOF, it descrambles everything until next month.

GI fought back. They potted their PC boards in epoxy; the pirates dug it off. They designed new ICs; the pirates cracked them, too. They raided addresses that subscribed to every service (the "master" for a chain of clones) only to find a vacant lot. They'd catch a pirate and seize his equipment; a week later he was back in business, saying "I had to pay my fines somehow." They hunted down hot serial numbers and sent "destruct" commands to kill the boxes using them; the legitimate owners (who often didn't know their box had been cloned) sued GI for malicious property damage.

So much for the uncrackable algorithms. Pirates actually outnumber legitimate dealers, and advertise openly. Even GI admits that the majority of VC-IIs sold have been modified. A pirate VC-II costs $100-$500 over the normal $395 list, and will typically work 1-6 months before GI shuts it down. At that point, you'll find out if your dealer is a Robin Hood or a Blackbeard: the Robin Hoods will get you going with a new key or chip at little or no cost; the Blackbeards either charge a stiff fee or can't be found at all.

The other route is to subscribe legally. It's actually cheaper if you just get a few low-cost channels. There are also subscription services that work like Publisher's Clearinghouse: package deals on 20-100 channels at various discounts. But pretend you live in a cornfield in Nebraska; they can't sell to an address inside a local cable company's monopoly service area.

CLASSIFIED AD

SUFFERING FROM A TERMINAL DISEASE? Or would you just like to attend a con 500 years from now? Cryonics may be for you, and it's quite affordable. For information call toll free 1-800-367-2228, or write to Alcor, 12327 Doherty St.,Riverside CA 92503. We also throw great parties.

Pons and Fleischmann Address The Troops

by Charles Ott

A series of four skits, as presented by Moebius Theatre for Conclave XIV, October, 1989.

Two

FLEISCHMANN: Hi, I'm Martin Fleischmann.

PONS: And I'm B. Stanley Pons, here today to tell you about Humble's Farm Fresh Mayonnaise.

FLEISCHMANN: You know, after a hard morning in the lab, nothing tastes as good as a cold egg-salad sandwich.

PONS: And nothing makes egg-salad taste better than Humble's Farm Fresh Mayonnaise.

FLEISCHMANN: It's made with real eggs.

PONS: From organically-fed chickens.

FLEISCHMANN: Right here in sunny Utah!

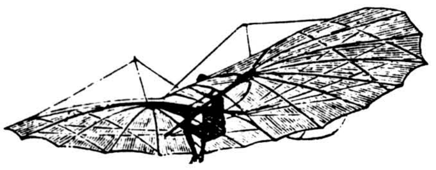
PONS: And when you've eaten the last delicious spoonful, the jar is the perfect shape for cold fusion experiments!

FLEISCHMANN: We wouldn't use any mayonnaise jar but Humble's for our important experiments.

PONS: And you shouldn't either. So if you find your egg-salad lacks zest, or your Tartar sauce isn't tart ...

FLEISCHMANN: Or your cold fusion experiments aren't working ...

PONS: Do what we do — try Humble's!



Pons and Fleischmann Address The Troops

by Charles Ott

A series of four skits, as presented by Moebius Theatre for Conclave XIV, October, 1989.

Three

FLEISCHMANN: Hi, I'm Martin Fleischmann.

PONS: And I'm B. Stanley Pons.

FLEISCHMANN: When you really want cold fusion on a hot summer's day ...

PONS: There's nothing like mountain spring water from Utah.

FLEISCHMANN: Cold, clear, bursting with minerals and heavy with deuterium.

PONS: It's pure-brewed here in God's country!

FLEISCHMANN: Cold fusion. It's the water!

Pulling Outer Space into Your Back Yard

Mike Smithwick

Like many companies and agencies, NASA supports its own television network. It is known as "NASA Select Television" and is used for everything from teleconferences (with audio on landline) to mission coverage. As far as I know, it is not meant to be private. Much has been written about it in satellite TV magazines, and there were plans at one time between NASA and some TVRO companies to get low-cost dishes to schools for STS-51L (the *Challenger's* final mission) and flights following. Also, most of the network video comes from the feeds.

Forget about the teleconferences—they're pretty dull material—but the other stuff can easily make it worth the cost of a dish.

All, and I mean *all*, non-classified launches are covered live. So you could've watched that Delta explosion, as it happened, or the last of the Atlas launches. You can also watch press briefings on planetary probes (Voyager, Magellan, and Galileo, for example) and scientific satellites.

Of course, the best part is the shuttle coverage. The coverage begins several days ahead of the launch with assorted news conferences with the crew and payload people. On launch day, tune in about 3 or 4 hours ahead of time. You'll get the Public Affairs Office commentary with the ground-loop chit-chat.

Thirty minutes after launch they'll replay all of the launch video, from all of the color camera positions, unedited, from about T-10 secs to staging. At T+45 minutes they'll show the launch from the black and white on-pad engineering cameras. It knocked my eyeballs out the first time I saw it. And so far, I have never, ever seen any of the networks pick it up. You'll see views from cameras immediately to the side of the SRBs, or out next to one of the wings. 9 or 10 different views in all.

After the launch replays, they switch over to JSC until landing. Most of the views are from those el-cheapo color cameras in the corner of Mission Control looking over the consoles, or at the plot-board. But when there is downlink TV they show it.

If the downlink TV is broadcast directly to a ground station (as it usually is until the satellites are out of the payload bay), when live, it'll be a funny flickering black-and-white image. What you're seeing is the raw, unprocessed, sequential-frame video. That is, one frame is red, one green and one blue. They then merge everything together and replay it a few minutes after LOS (loss-of-signal). The ground stations use the same transponder for their relays, so you'll see the signal drop for a few seconds, then come back from Hawaii or Goldstone. When the TV comes down from the TDRSS (Tracking and Data Relay Satellite), it is real-time color as the color processing is apparently done at the TDRSS station or someother remote site.

There is talk of replacing all of the shuttle cameras with modified CCD home units, like your camcorder. These won't be needing the color-conversion required by the old Apollo-vintage cameras. They also provide much better colors and sharper images. However the B&W payload bay cameras come equipped with very sensitive image intensifiers. These are used for observing lightning, aurora, stars (down to about 4th or 5th magnitude) and other low-light phenomena. Perhaps the most remarkable sequence I've seen started with thunderstorms over Houston and ended with a meteor streaking through the upper atmosphere along the horizon.

All in-flight press briefings are broadcast, as well as science films about certain experiments (mainly during Spacelab). And in some cases EVA rehersals in the water tank or building 15 (I think) are sent out.

What really makes it fun, is when the guys in the TV control room get loose. And it's late at night, and...well, maybe I better not say anything about that.

The current transponder is on Satcom F-II, way over the Atlantic, transponder 13. It has a brutally strong signal here on the left-coast, so anyone this side of Mars oughta be able to get it.

I use a 12-foot dish with a 60 degree LNA, but on the east coast, there should be little problem seeing it with an 8- or even 6-foot dish.

NASA posts Shuttle TV schedules on the "COMSTORE" BBS in Houston about 2 or 3 days before the mission. The phone number is (713)483-5817.

(If you are in an international mood, you may want to try "ESA Select" the next time a European Space Agency Ariane is launched. The ESA broadcasts bounce around from satellite to satellite, so they require some searching. They typically come on about 45 minutes before launch with scenes of the control room. Most Ariane launches take place about 1 AM UTC. One satellite the boys in Guyana sometimes use is Spacenet 1, around transponder 21 or so.)

So on the next Shuttle flight, thumb your nose at the TV networks, tune in to the bird, and be prepared for excitement. Also, stock up on video tape—you'll be needing lots of it.

[Editor's Note: Many cable TV operators carry NASA Select on an idle channel. You may be able to persuade your cable company to do the same, with a polite letter and the technical information Mike gives above. -WSH]

Pons and Fleischmann Address The Troops

by Charles Ott

A series of four skits, as presented by Moebius Theatre for Conclave XIV, October, 1989.

Four

FLEISCHMANN: Hi, I'm Martin Fleischmann.

PONS: And I'm B. Stanley Pons, and we have an important message for all of you workers in the fast-growing field of cold fusion.

FLEISCHMANN: It turns out we weren't using heavy water after all.

PONS: Now that we look into it a little closer, we found we'd independently rediscovered ... polywater!

FLEISCHMANN: So that's the secret! Honest!

[At this point the announcer comes on, blowing a whistle, and chases them off the stage with whistle blasts. As he comes back, he mentions, "It's about time somebody blew the whistle on those two!"]

Fuzzy Logic

Lee Hart

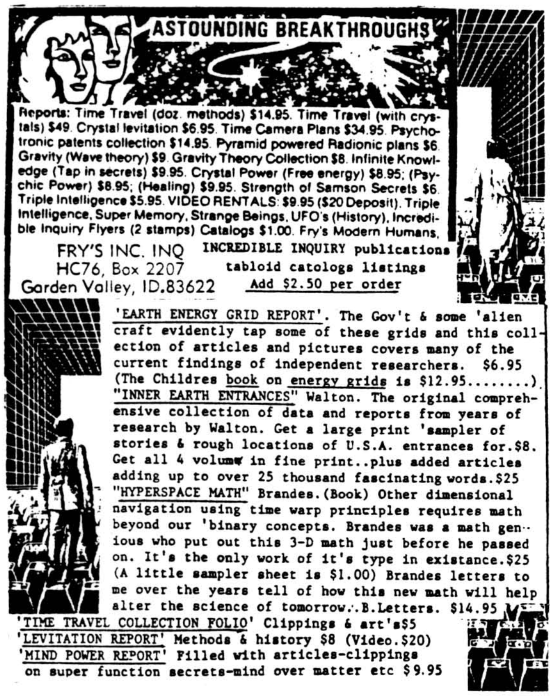
I keep seeing more about fuzzy logic, the "next generation" of IC's. *EE Times* ran a good multi-part description, and *EDN* and *Electronics* both had articles. The theory was developed by an American, who couldn't get funding or interest from U. S. companies. A Chinese researcher used the theory to build real machines, which are being manufactured and sold in Japan.

You use "fuzzy" gates, with a multitude of logic levels (not just 0 or 1). Sort of an op-amp with digitally quantized I/O so errors don't accumulate. Like op-amps, they can implement extremely complex algorithms with very little logic. Real-time solutions of differential equations, that sort of thing.

The Chinese/Japanese have built a microcomputer with fuzzy logic. The instruction set is unusual; "sum," not "add," "jump if small," not "jump if zero." They talk about speed in "inferences per second," not instructions per second. The result is a machine with 1% of the parts and 10 times the speed of conventional micros.

Working examples include a dispatcher that adjusts train schedules to handle rush-hour commuter loads, an aircraft autopilot, and a computer that parallel-parks a car. They're now selling a three-board set that plugs into a PC. The programming language is not computerese, but English—though the reviewer said it's a sort of pidgin English, like you find in Japanese operating manuals.

A fuzzy micro is programmed by trial-and-error; you give it inputs and outputs, and a definition of "good" and "bad" result. It then figures out the rules by itself. For instance, the aircraft autopilot was not pre-programmed with the flight dynamics of the plane; it figured them out for itself from a generic set of rules for aircraft in general. This can lead to surprising results. When they first tried the train dispatcher, it would *back up* a partially-empty train that had just left a station if a sudden rush of commuters arrived. After all, it was the closest train with space available...



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Tom Swift and his Portable Laser Rifle

Michael Davis

A number of people have expressed interest in how to stuff a gas laser, power supply, and a 20-30 min supply of batteries all inside a bazooka-sized metal tube and make it work, so to follow is a description and some information on the laser gun that Tullio and I built.

Like many before me, I've toyed with science lab lasers, shooting between the legs of unsuspecting pedestrians at night from rooftops, generating light-show interference patterns on walls by putting things in the beam, or making a general nuisance of myself with the neighbors across the street, but always there was the hassle of having to depend on an extension cord or a nearby AC outlet. I realized early that in order to successfully pull pranks or startle people by putting a scintillating spot on them or by flashing a blazing red beam past their nose on a foggy night the laser you use needs to be mobile and portable. I almost got into trouble during a nighttime navy signal drill in the Atlantic once, because in order to take the laser up on deck to send an unauthorized message the extension cord trailing behind kept a hatch from closing and allowed another ship to get a bearing on the ordinary light leaking through the open hatch. Besides that, a Star Trek or Buck Rogers raygun loses a lot of effect when it has to be plugged into a wall socket like an electric toaster.

Over a year ago, a Metrologic Instruments catalog described a 2" dia. x 5" long cylindrical power supply which ran on 12VDC and could drive a 3mw He-Ne laser. I was hooked.

A search for suppliers when Metrologic wouldn't sell separate power supplies led me to Jerry Banks of Clark Engineering in Ann Arbor. He has an equivalent power supply roughly the size of a small cigarette pack and some relatively inexpensive RCA surplus gas laser tubes. Tullio located some Panasonic tape recorder nicad packs providing 1.5 amp-hr @4.8V which break down into 4 C-size cells. A combination of 11 of these cells could be charged to 14V and would drive a 2mw laser unit continuously for 20-30 minutes until the voltage dropped below 9V.

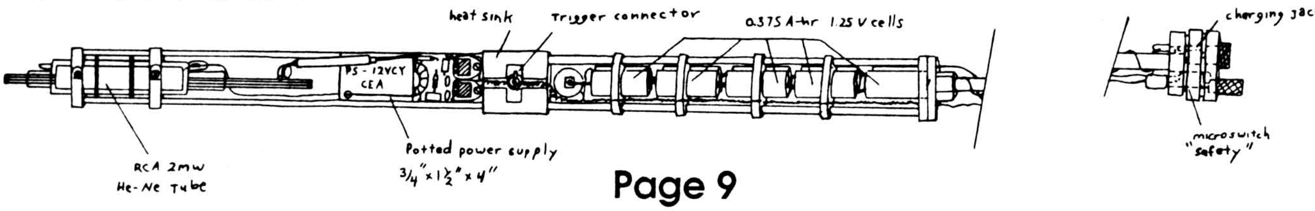
We were then in business. I had some ideas on the general design, the forward cooling fins which became focussing coils, a 10X beam expander and the rifle scope, but it's obvious the real design and construction work was done by a local Italian master craftsman. The result is a 'polite weapon' which looks like it could tunnel through a brick wall in five seconds flat.

The interior design finally agreed upon was the easiest -- stacking the components end to end and including a large block heat sink because the power supply wasted as much energy as it modified to drive the tube. (Please see detailed sketch)

From front to back: The laser tube is shock-mounted with aluminum clamps and rubber o-rings to the steel posts which terminate in the aluminum cylinder heatsink. Nestled between the posts is a 90kΩ ballast resistor and the DC-DC converter, which gives a starting voltage of 11KV that drops to 1.6KV DC at 5ma when the tube fires. It is bolted to the heat sink behind it that holds a stereo jack for the trigger switch connector. The connector wires feed through a hole in the handgrip plate on the bottom of the rifle to the trigger switch. The heat sink is connected to two larger steel pins which make up the frame for the plexiglass disks spaces along them. These disks hold the batteries. One cell is mounted sideways and two rows of five axial nicads are held in place with thermoplastic from a glue gun.

A large pin goes to the circular backplate, which holds the safety switch and a charging jack, and is tapped for cover plugs for both. The metal mounting rings for the laser tube, the heat sink, and the back plate are all flush with the inside wall of the rifle barrel. For field stripping, the entire assembly slips out the back of the gun when the trigger connector is unplugged and the allen screws are removed from the barrel. This makes the unit insensitive to a reasonable amount of shock and also makes use of the housing to dissipate heat.

Laser Rifle - Interior Details



With the safety off, a full charge and a dark night, the rifle will now go anywhere except underwater, into banks, and into airport terminals, and has an effective visible spot range of about five miles. The laser light can be seen 25 miles away on a clear night and the beam makes a nice sparkling effect in the rain or snowstorm, becoming a 100 yard light saber in fog from the scattering effect. As soon as convenient, we'll be adding an oscillator to add a low pitch bussing or humming sound to give it more impact and a selector switch for external power, so it can be run continuously for several hours each month to insure the discharge tube stays healthy and to allow for gun belt or bandoleer use in the field. Until then, and probably even afterwards, it's going to see a lot of action around campus and at conventions.

(Addenda: Michael's article was written a number of years ago, but the information is still useful if you wish to make your own laser gun. However the sources for laser components named in the article are no longer valid. Two current sources are: Meredith Instruments, P.O. Box. 1724, Glendale, Arizona, 85301; and MWK Industries, 1440 S. State College Blvd., Building 3B, Anaheim, Calif., 92806.

Note: It is no longer a good idea to flash your laser around people carelessly. Folks have gotten a bit gun-shy because of laser gun sights. Please, be careful! --MLSJ)

Space Telescope Reveals Life Elsewhere in Universe

Bill Higgins

It started with the midges. I've been reading the Shuttle Status Reports that Kennedy Space Center publishes to report progress on NASA's various missions. Every astronomy buff has awaited the launch of the Hubble Space Telescope for years, and nobody wants the slightest thing to go wrong with it. So I was concerned to read this:

KSC SHUTTLE STATUS REPORT - WEDNESDAY, MARCH 28, 1990 - 3 P.M.
STS-31 - DISCOVERY (OV-103) - LAUNCH PAD 39-B

Installation of the Hubble Space Telescope is now scheduled for tomorrow. Yesterday, technicians worked to rid the Payload Changeout Room of midges. A midge is an insect that looks like a small mosquito. Five special traps were set up in the PCR and hourly counts were made...

My overactive imagination, twisted by the effects of reading too many NASA press releases, produced the following.

W. Skeffington Higgins	May 1, 1990
NASA Headquarters, Washington, D.C.	Noon EDT

RELEASE: 90-57

SPACE TELESCOPE REVEALS LIFE ELSEWHERE IN UNIVERSE

Astronomers using NASA's Hubble Space Telescope (HST) have announced the discovery of life in outer space. Large insect-like creatures are the first major result from the new telescope, which was launched April 15 aboard the shuttle Discovery.

Early images obtained with the HST reveal huge creatures which resemble mosquitoes or midges, but are billions of times larger. Features such as wings, legs, and compound eyes can be discerned in the pictures.

Although the 2.4-meter telescope was expected to reveal many new discoveries, the new findings came as a complete surprise to scientists. "We never expected that the Hubble would find living creatures," said Herbert Polhode, a spokesman for the Space Telescope Science Institute in Baltimore, "and we never expected that life in space would be so widespread. It seems to be everywhere we look." So far, the alien creatures have been observed in the vicinity of several stars, in the nuclei of active galaxies, and even orbiting the planet Jupiter.

On Monday HST astronomers sent a telegram to notify the International Astronomical Union (IAU) of their dramatic discovery. The news is expected to excite great interest among astronomers, biologists, and other scientists. Because of its high angular resolution and its location above the Earth's obscuring atmosphere, the HST is the only telescope currently able to see the interstellar creatures. Continued intense study is planned to determine the origin and habits of the "insects."

Late!

Bill Higgins

Like the butcher who accidentally backed into a meatgrinder, we've gotten a little behind in our work.

As long-time readers know, when we in the Chicago gang took over the publication of *PyroTechnics*, we were determined to avoid a major pitfall that previous editors had encountered. Sooner or later, your editor will get real busy with something else, and the publication schedule for *Pyro* will begin to slide. This newsletter has existed for about fourteen years, and at least twice there have been intervals of more than a year when no issues came out.

Our theory was that if production of the zine did not rest on one set of shoulders, it would be easier to keep to a regular schedule. And it worked fairly well for our first year. But this time we've blown it.

No excuses. Just our apology. We're sorry.

Our delay became so long that the leading edge of issue 44 rammed into the rear end of issue 45, and they stuck together. So we're mailing out both in one package. We hope you enjoy the double dose.

We promise to do better in the future. If you come out frequently, it helps sustain interest in your publication. And authors enjoy seeing their contributions appear in a timely fashion. (Though one article in these issues has been lying around since the First Golden Age of General Technics—1978. We hope Michael Davis is happy to see it in print at last.) GTers (and others) have been wonderful about sending us articles, gossip, and artwork. *Pyro* wouldn't exist at all without this kind of support, and we appreciate it.

We're already hustling to get issue 46 into shape. If you've got something good to say, please get it to us by our 5 May deadline. See you in the summer!